doubt correct. As far as I have been able to determine, when they first enter the egg, these granules differ in no wise from those in other parts of the food stream that develop into yolk spherules.

Now the early developmental features of the germ cells in this species point not so much to a process of active differentiation as one of passive isolation, which results in the pole cells retaining or preserving the reproductive potentialities of the cleavage nuclei; the pole-disc meanwhile serving as food material for the pole cells which "as a result of this special kind of nutrition undergo a peculiar method of metabolism which differentiates them from the somatic cells"—just as a certain kind of food is necessary for the early growth and development of a child, but is by no means the cause of its becoming a man instead of an ape.   H. L. WIEMAN

UNIVERSITY OF CINCINNATI,
    January 27, 1911

THE PYTHAGOREAN THEOREM

DR. NORTHRUP'S article[1] is not a proof of what is sometimes—perhaps incorrectly—called the *Pons asinorum*, unless it be shown *experimentally* that the kinetic energy of a body is the sum of its energy of translation and of rotation. The deduction, however, of this theorem of energy from the fundamental propositions of mechanics depends on the law of vector superposition, the mathematical expression of which involves the Pythagorean theorem. In general it is not economical to derive mathematical propositions from experimental physics; moreover, the process fails to bring out that difference between mathematics and physics which is shown, for example, in Hilbert's "Foundations of Geometry" and Mach's "Science of Mechanics."

I should like to be permitted the liberty of objecting to the statement:[2]

"No motion, force or acceleration which exists at the point p can produce rotation of $1 — 2$ about p as center. This must be so, as it is axiomatic in dynamics that, when there is

[1] SCIENCE, XXXII., 833, p. 864.
[2] *L. c.*, p. 864.

a force or acceleration at the center of mass only of a body, there remains no couple to produce rotation": first, because the word "axiomatic" seems to be used in the Kantian sense of "self-evident," and second, because Dr. Northrup's proof (?) in no way depends on whether p has linear or $1 — 2$ has angular acceleration.

Equation 7 of the paper expresses a geometric fact—I am tempted to say "accident"—which text-books raise to the dignity of a theorem.   R. F. DEIMEL

To THE EDITOR OF SCIENCE: Referring to your December 16 issue, if we are to have "A Dynamical Proof of the Pythagorean Theorem," why not let it be a simple one? For instance, if the force F whose rectangular components are X and Y, acts upon a particle of mass m until it has imparted the velocity q whose components in the same plane are u and v, then the work done upon the particle by X is equal to $\frac{1}{2}mu^2$, while the work done by Y is $\frac{1}{2}mv^2$. But the work done by the components is identical with the work $\frac{1}{2}mq^2$ done by their resultant. Equating and cancelling the factor $\frac{1}{2}m$,

$$q^2 = u^2 + v^2.$$

But the velocity components u and v are the two legs of a right triangle of which q is the hypothenuse, so that here again is our Pythagorean relation.   MAYO D. HERSEY

U. S. BUREAU OF STANDARDS,
    WASHINGTON, D. C.

QUOTATIONS

THE TENURE OF PROFESSORSHIPS

AMONG the reforms suggested by the "efficiency expert" of the Carnegie Foundation who investigated the administration of some of the principal American universities was the appointment of professors for a brief period, so that they could be dropped without fuss whenever for any reason a change was desired. His idea was to get young, vigorous men, work them hard as long as they could stand the strain, and then pension them off in the interest of efficiency. Somewhat similar views have of late been expressed by several univer-

sity presidents—who would perhaps consider a president's position as quite different—and the *Popular Science Monthly* in its March number presents both sides of the case, deciding in favor of permanent tenure. President Butler, of Columbia University, in connection with the recent dismissal of a professor, took the ground that a teacher has destroyed his academic usefulness when he offends against common morality, or against "the dictates of common sense." President Van Hise, of the University of Wisconsin, takes the position that "there is no possible excuse for retaining on the staff of a university an inefficient man." And he complains that it is too often assumed that universities exist for the instructional force: "That the main thing is to give that force a comfortable and happy time, an opportunity for a somewhat easy existence as a teacher, leisure for browsing through literature, and long vacations."

Very likely to the employing class, accustomed to deal summarily with employees earning much more than a college professor, it may seem an anomaly to appoint men permanently instead of leaving them subject to a week's warning. Yet as the *Popular Science Monthly* points out, there are precedents, as in the army, the navy and the higher courts, and permanence of office, when introduced, is intended to improve the service, not to demoralize it: "It is attached to honorable offices, where public spirit and self-sacrifice are demanded, and the wages do not measure the performance."

It may be urged, of course, that in the interest of efficiency the wages should be made to measure the performance; that the teaching business should be put on a cold-blooded commercial basis, with no sentimental nonsense. Let every university bid for the best men, and discharge any employee when a more efficient man for the job can be found. The system works after a fashion in the business world, though even there its full rigor is only applied now and then by remorseless employers. The general rule even in business is that a man is retained while he gives reasonable satisfaction,

even though it might be possible to fill the post in a more ideal fashion. Perhaps that, too, will come when the efficiency experts have completed their reform of American business system.

How it would work in the academic world is another matter, and opinion may differ as to whether it would produce more efficient or less efficient teachers than are found under the present easy-going old-fashioned ways. The one sure thing is that it would bring in a very different type of man. Of course if the machine is to be "speeded up" and only the young and energetic are to find a place in it, the pecuniary rewards must be made commensurate if the profession is to be made attractive to men of ability. And without doubt the offer of gorgeous salaries would draw in brilliant young men who now see nothing worth while in teaching because they can make more money in business. But that the net result would be a strengthening of the teaching force is by no means so certain. What efficiency experts sometimes forget is that there is a type of ability that can be found and retained better by the offer of a secure and dignified post than by the flourishing of money. The *Popular Science Monthly*, which is by no means sentimental, hits at an important truth when it says:

But it appears that the general course of social evolution is not toward competition. In the university it would probably be adverse to the finer traits of scholarship and character, most of all when, as under our present system, the competition would be for the favor of presidents and trustees.

No doubt a university tends to accumulate "deadwood," and it is easy to understand the desire a president must often feel to make a clean sweep. Nevertheless it is probable that these disadvantages are more than offset by the republican spirit which prevails in the faculty of a happily governed college or university, the spirit of equality and of disinterested service. It would be a pity to have the seclusion of the university, the citadel of idealism, given up to selfish scrambling for a better "job."—Springfield *Republican*.